



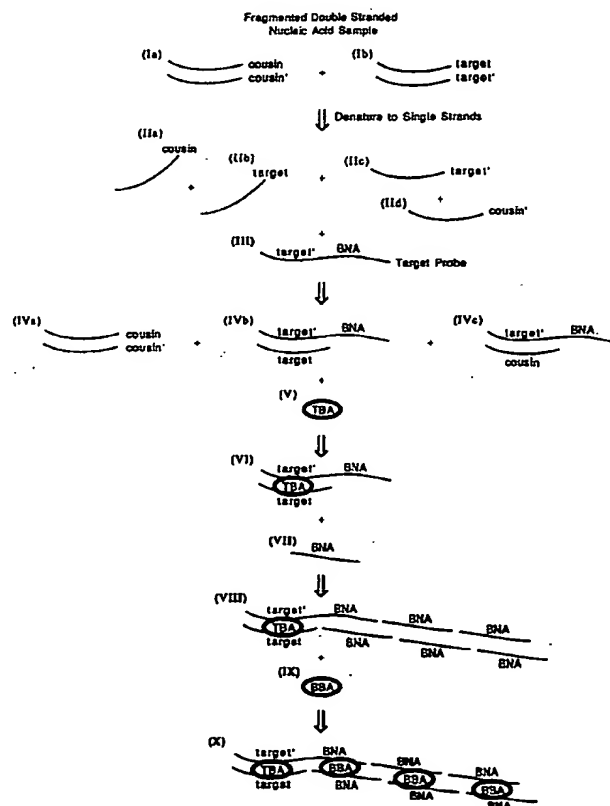
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>C12Q 1/68</b>		A3	(11) International Publication Number: <b>WO 96/17956</b>
			(43) International Publication Date: 13 June 1996 (13.06.96)
(21) International Application Number: PCT/US95/15944		(81) Designated States: AL, AM, AU, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IS, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TM, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).	
(22) International Filing Date: 7 December 1995 (07.12.95)			
(30) Priority Data: 08/353,476 9 December 1994 (09.12.94) US			
(71) Applicant (for all designated States except US): THE GENE POOL, INC. [US/US]; Suite 392, 300 Queen Anne Avenue North, Seattle, WA 98109-4599 (US).		Published With international search report.	
(72) Inventors; and (75) Inventors/Applicants (for US only): WEININGER, Susan [US/US]; Suite 392, 300 Queen Anne Avenue North, Seattle, WA 98109-4599 (US). WEININGER, Arthur, M. [US/US]; Suite 392, 300 Queen Anne Avenue North, Seattle, WA 98109-4599 (US).		(88) Date of publication of the international search report: 24 July 1997 (24.07.97)	
(74) Agents: BENCEN, Gerard, H. et al.; Saliwanchik & Saliwanchik, Suite A-1, 2421 N.W. 41st Street, Gainesville, FL 32606-6669 (US).			

(54) Title: METHOD OF DETECTION OF NUCLEIC ACIDS WITH A SPECIFIC SEQUENCE COMPOSITION

## (57) Abstract

This invention is a novel method for detecting and localizing specific nucleic acid sequences in a sample with a high degree of sensitivity and specificity. The method and novel compositions used in the method involve the use of Probe Nucleic Acids, the production of nucleic acid binding regions and the use of nucleic acid Target Binding Assemblies to detect and localize specific Target Nucleic Acids. The detection and localization of the Target Nucleic Acid is accomplished even in the presence of nucleic acids which have similar sequences. The method provides for a high degree of amplification of the signal produced by each specific binding event. In particular, methods and compositions are presented for the detection of HIV and HPV nucleic acid in samples. These methods and compositions find use in diagnosis of disease, genetic monitoring, forensics, and analysis of nucleic acid mixtures. Some of the novel compositions used in the detection method are useful in preventing or treating pathogenic conditions.



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# INTERNATIONAL SEARCH REPORT

International Application No.  
PC./US 95/15944

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
6 X	EP,A,0 146 039 (MILES LAB) 26 June 1985	1,4,5, 26, 37-41,51
Y	see page 15, line 3 - line 17	2,3, 6-11,27, 31-33,42
	see page 20, line 4 - page 28, line 15; claims 1-7	
6 X	EP,A,0 450 594 (SEGEV DAVID) 9 October 1991	1,4,5, 26, 37-41,51
Y	see page 6, line 47 - page 7, line 3 see page 7, line 10 - page 12, line 55	2,3, 6-11,27, 31-33,42
	see page 8, line 24 - line 43; figures 1,2	
	--- -/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

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- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- "A" document member of the same patent family

Date of the actual completion of the international search

27 August 1996

Date of mailing of the international search report

02 September 1996 (02.09.96)

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-2016

Authorized officer

Gurdjian, D

## INTERNATIONAL SEARCH REPORT

Intern. Application No.  
PC-ES 95/15944

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
6	X WO,A,87 03622 (UNIV PRINCETON) 18 June 1987  Y see page 4, line 25 - page 5, line 13 see page 7, line 15 - page 8, line 9  see page 25, line 1 - line 15; claim 21; figure 1 ---	1,4,5, 26, 37-41,51  2,3, 6-11,27, 31-33,42
6	Y WO,A,93 00446 (GENELABS INC) 7 January 1993 see page 7, line 2 - line 10 see page 6, line 4 - line 12 ---	6,32,33
2	A EP,A,0 453 301 (SYNTEX INC) 23 October 1991 cited in the application see page 4, line 25 - line 32 see page 5, line 33 - page 6, line 9 ---	1,4,5, 26, 37-41,51
6	A EP,A,0 147 665 (MOLECULAR DIAGNOSTICS INC) 10 July 1985  see abstract; claims 1-12; figure 1 -----	1,4,5, 26, 37-41,51

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/15944

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- claims 1 (partly), 4-6 (partly); 26, 30, 37-41, 51
- claims 1 (partly), 2, 3; 4-6 (partly); 7-11, 27, 31-35, 42
- claims 12-25, 28, 29, 36, 43-50

- see continuation-sheet PCT/ISA/210 -

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:  
  
1-11, 26, 27, 30-35, 37-42, 51
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☒ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US95/15944

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

1. claims 1(partly), 4-6(partly), 26, 30, 37-41, 51:  
Probe nucleic acids that have no single stranded booster binding regions and methods of detection using them
2. claims 1(partly), 2, 3, 4-6(partly), 7-11, 27, 31-35, 42:  
Probe nucleic acids that have one or more single stranded booster binding regions and methods of detection using them
3. claims 12-25, 28, 29, 36, 43-50:  
Target binding assemblies, booster binding assemblies, therapeutic binding assemblies and methods of assembling them

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>GP-100.C1</b>	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. <b>PCT/US95/15944</b>	International filing date (day/month/year) <b>07/12/95</b>	(Earliest) Priority Date (day/month/year) <b>09/12/94</b>
Applicant <b>THE GENE POOL, INC. et al.</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☒ Unity of invention is lacking (see Box II).

3. ☒ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☒ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. 8 ☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

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**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
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because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

- claims 1 (partly), 4-6 (partly); 26,30,37-41,51
- claims 1 (partly), 2,3; 4-6 (partly); 7-11,27,31-35,42
- claims 12-25,28,29,36,43-50

- see continuation-sheet PCT/ISA/210 -

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
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1-11, 26, 27, 30-35, 37-42, 51
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

1. claims 1(partly), 4-6(partly),26,30,37-41,51:  
Probe nucleic acids that have no single stranded booster binding regions and methods of detection using them
2. claims 1(partly),2,3,4-6(partly),7-11,27,31-35,42:  
Probe nucleic acids that have one or more single stranded booster binding regions and methods of detection using them
3. claims 12-25,28,29,36,43-50:  
Target binding assemblies, booster binding assemblies, therapeutical binding assemblies and methods of assembling them

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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 146 039 (MILES LAB) 26 June 1985	1,4,5, 26, 37-41,51
Y	see page 15, line 3 - line 17  see page 20, line 4 - page 28, line 15; claims 1-7 ---	2,3, 6-11,27, 31-33,42
X	EP,A,0 450 594 (SEGEV DAVID) 9 October 1991	1,4,5, 26, 37-41,51
Y	see page 6, line 47 - page 7, line 3 see page 7, line 10 - page 12, line 55  see page 8, line 24 - line 43; figures 1,2 --- -/-	2,3, 6-11,27, 31-33,42

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

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- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

27 August 1996

Date of mailing of the international search report

02.09.96

Name and mailing address of the ISA

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Gurdjian, D

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,87 03622 (UNIV PRINCETON) 18 June 1987	1,4,5, 26, 37-41,51
Y	see page 4, line 25 - page 5, line 13 see page 7, line 15 - page 8, line 9	2,3, 6-11,27, 31-33,42
	see page 25, line 1 - line 15; claim 21; figure 1 ---	
Y	WO,A,93 00446 (GENELABS INC) 7 January 1993 see page 7, line 2 - line 10 see page 6, line 4 - line 12 ---	6,32,33
A	EP,A,0 453 301 (SYNTEX INC) 23 October 1991 cited in the application see page 4, line 25 - line 32 see page 5, line 33 - page 6, line 9 ---	1,4,5, 26, 37-41,51
A	EP,A,0 147 665 (MOLECULAR DIAGNOSTICS INC) 10 July 1985 see abstract; claims 1-12; figure 1 -----	1,4,5, 26, 37-41,51

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 95/15944

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0146039	26-06-85	AU-B- 578436	27-10-88
		AU-B- 3656084	20-06-85
		AU-B- 578641	03-11-88
		AU-B- 3656184	20-06-85
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		JP-A- 7088000	04-04-95
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WO-A-8703622	18-06-87	US-A- 4882269	21-11-89
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		JP-T- 63501984	04-08-88
		US-A- 5424188	13-06-95
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 95/15944

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A-9300446		AU-B- 2297892	25-01-93
		CA-A, C 2112130	07-01-93
		EP-A- 0593618	27-04-94
		JP-T- 7500491	19-01-95
		US-A- 5306619	26-04-94
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EP-A-0453301	23-10-91	CA-A- 2040896	21-10-91
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-----			
EP-A-0147665	10-07-85	US-A- 4724202	09-02-88
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		JP-A- 60144662	31-07-85
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## PATENT COOPERATION TREATY

PCT

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(PCT Article 20)

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Washington, DC 20231  
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in its capacity as designated Office

Date of mailing:

24 July 1997 (24.07.97)

The International Bureau transmits herewith copies of the international applications having the following international application numbers and international publication numbers:

International application no.:

PCT/US95/15944

International publication no.:

WO96/17956

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## INTERNATIONAL COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

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To:

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Washington D.C. 20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 22 July 1996 (22.07.96)	
International application No. PCT/US95/15944	Applicant's or agent's file reference GP-100.C1
International filing date (day/month/year) 07 December 1995 (07.12.95)	Priority date (day/month/year) 09 December 1994 (09.12.94)
Applicant WEININGER, Susan et al	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

08 July 1996 (08.07.96)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 18 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
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1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Jocelyne REY-MILLET

Telephone No.: (41-22) 730.91.11

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